

whorls, 5.05. From Lewistown, altitude 4,792 feet. Large diameter, 16.80; depth, 11.78; aperture, 7.66; number of whorls, 5.28.

From the above it will be seen that the specimens at higher altitude are diminished in size, as also in the number of whorls in the shell, as is the case of those west of the main range.

The following table of comparisons of ten average specimens will give a better idea of the differences than can be given in any other way:

	Altitude.	Large Diam.	Depth.	Aperture.	No. whorls.
Flathead Lake	3,000	23.12	13.96	10.85	6.01
McDonald Lake	3,300	22.16	12.98	10.66	5.99
Sinyaleamin Lake . . .	3,800	21.82	12.28	10.24	5.75
Lewistown	4,792	16.80	11.78	7.66	5.28
Mt. Lo Lo	5,000	13.83	6.12	5.57	5.15
Tobacco Root Mts. . .	7,000	15.21	9.30	7.06	5.05
McDonald Peak	7,800	10.17	4.79	4.25	4.47
Sinyaleamin Peak . . .	8,500	8.91	4.34	3.99	4.26

In examining the preceding table, it will be remembered that the specimens from Lewistown and the Tobacco Root mountains were taken east of the continental divide, all the others from the west slope. The series ranges from 3,300 to 8,500 feet altitude. There is a gradual diminution in each measurement, the smallest and highest specimens showing about one-third the dimensions of the lowest and largest, with the whorls diminished almost two, or nearly one-third.

The two collections from the east side of the range show the same reduction, but the series is much smaller. I thought there was an error in the altitude of those from the Tobacco Root range, but as Mr. Douglass insists there is not, it appears that conditions there must differ from those prevailing elsewhere in the State.

WRITINGS OF JAMES G. COOPER, M. D., ON CONCHOLOGY AND PALAEO-
ONTOLOGY, WITH LIST OF SPECIES DESCRIBED BY HIM.

COMPILED BY WILLIAM J. RAYMOND.

Abbreviations: Proceedings of the California Academy of Sciences, first series: Pr. C. A. S.; second series, Pr. C. A. S. (2).

Bulletin of the California Academy of Sciences: Bull. C. A. S.
American Naturalist: Am. Nat.

American Journal of Conchology: Am. J. Conch.

An asterisk denotes that the species was discovered by Dr. Cooper. In addition to the species named in this list, more than eighty were discovered by Dr. Cooper and described by Newcomb, Carpenter and Gabb in 1863 and 1864.

1. Report of Explorations and Surveys for a Railroad to the Pacific Coast. Washington, 1860, XII, Part 2. Report upon the Mollusca Collected on the Survey, by William Cooper, with notes by J. G. Cooper, pp. 369-386. Also published in The Natural History of Washington Territory, by J. G. Cooper, M. D., and Dr. G. Suckley, U. S. A., 4to, pp. xiv, 497, New York, 1859.

**Chrysodomus middendorffi* n. sp. (William Cooper).

**Nassa gibbsii* n. sp.

**Ancylus caurinus* n. sp.? (No description.)

**Planorbis planulatus* n. sp.

Also Pac. Railroad Rep., I, 219-221, 1855, Natural History Report. Incidental references to Mollusca.

2. Notice of Land and Freshwater Shells collected by Dr. J. G. Cooper in the Rocky Mountains, etc., in 1860. By T. Bland and J. G. Cooper, Ann. Lyc. Nat. Hist. N. Y., VII, 1-9, Pl. IV, 1861.

**Helix mullani* n. sp.

**Helix polygyrella* n. sp.

3. On some New Genera and Species of California Mollusca. Pr. C. A. S. II, 202-207. 1863.

Strategus n. gen.

**Pleurophyllidia californica* n. sp.

**Strategus inermis* n. sp.

**Doris montereyensis* n. sp.

**Æolis opalescens* n. sp.

**Doris sanguinea* n. sp.

**Æolis iodinea* n. sp.

**Doris alabastrina* n. sp.

**Tritonia palmeri* n. sp.

**Doris sandiegensis* n. sp.

4. *Strategus* (preoccupied) changed to *Navarchus*. Pr. C. A. S., III, 8.

5. On New or Rare Mollusca Inhabiting the Coast of California. Pr. C. A. S., III, 56-60, fig. 14. 1863.

Neaplysia n. subgen.

**Triopa catalinæ* n. sp.

**Aplysia californica* n. sp.

**Dendronotus iris* n. sp.

**Doris albopunctata* n. sp.

**Æolis barbarenaensis* n. sp.

6. On the New Genus of Terrestrial Mollusca Inhabiting California. Pr. C. A. S., III, 62-63, fig. 15. 1863.

**Binneya notabilis* n. gen., n. sp.

7. Descriptions of New Species of Marine Shells from the Coast of California, by Wm. M. Gabb. Pr. C. A. S., III, 1865. Described by Dr. Cooper, page 188.

**Gadinia (Rowellia) radiata* n. subgen., n. sp.

8. Description of a New California Helix, with notes on others already described. Pr. C. A. S., III, 259-261. 1866.

**Helix sequoicola* n. sp.

9. On a New Species of Pedipes Inhabiting the Coast of California. Pr. C. A. S., III, 294-5, fig. 29. 1866.

**Pedipes unisulcata* n. sp.

10. The West Coast Helicoid Land Shells. Pr. C. A. S., III, 331-9. A synopsis of 55 species.

11. Geographical Catalogue of the Mollusca found west of the Rocky Mountains, between 33° and 49° north latitude. Pamph. 4to, 40 pages. San Francisco, 1867. 795 species named, with geographical range.

12. Cronise's Natural Wealth of California. San Francisco, 1868. Chapter on Zoology by J. G. Cooper, M. D. 55 species of Mollusca, mainly edible, pages 499-501.

13. The Fauna of Montana Territory. Papers in six issues of Am. Nat. on Mammals, Birds, Reptiles, Fishes; and the Shells of Montana, vol. II, 486-7. 1868-9. 24 species enumerated, with notes.

14. On a New Californian Terrestrial Mollusc. Am. J. Conch., IV, 209, 210, Pl. 18, figs. 1-3. 1869.

Ammonitella yatesii n. gen., n. sp.

15. On the Distribution and Localities of West Coast Helicoid Land Shells, &c. Am. J. Conch., IV, 211-240. 1869.

16. Notes on the Fauna of the Upper Missouri. Am. Nat., III, 294-9. 1869. Includes list of 7 Mollusca.

17. The Naturalist in California. Am. Nat., III, 182-9 and 470-481. Incidental references to the Mollusca. 1869.

18. The West Coast Fresh-Water Univalves, No. 1. Pr. C. A. S., IV, 93-101. A synopsis of 43 pulmonate species. 1870.

**Ancylus caurinus* W. Cp. is here described. See No. 1.

**Planorbis occidentalis* n. sp.

19. On a New Californian Helicoid Land Shell. Am. J. Conch., V, 196-7, Pl. 17, fig. 8. 1870.

Daedalochila harfordiana n. sp.

20. Notes on West Coast Land Shells, No. II. Am. J. Conch., V, 199-219. 1870. Additions to paper No. 15, with classification of the Helices of the West Coast.

21. Notes on Mollusca of Monterey Bay, California. Am. J. Conch., VI, 42-70. 1870. A list of 197 species, with notes.

22. Additions and Corrections to the Catalogue of Monterey Mollusca. Am. J. Conch., VI, 321-2.

23. Note on *Gadinia* and *Rowellia*. Am. J. Conch., VI, 319, 320.

24. Note on *Waldheimia pulvinata* Gld. Am. J. Conch., VI, 320.

25. Monterey in the Dry Season. Am. Nat., IV, 756-8. References to the Mollusca.

26. Catalogue of the Invertebrate Fossils of the Western Slope of the United States. Part II. San Francisco, 1871. 30 pages. Intended merely as a check-list and for labels, supplementing the Geographical Catalogue of 1867.

27. On Shells of the West Slope of North America. No. 1. Pr. C. A. S., IV, 150-6, notes on 51 species; No. II, IV, 171-5, notes on 34 species.

28. On New Californian Pulmonata, etc. Proc. Acad. Nat. Sci., Phila., 1872, 143-154, Pl. 3.

**Limax (Amalia) hewstoni* n. sp. **Assimineea californica* n. sp.

**Limax campestris* Binney, var. **Alexia setifer* n. sp.

occidentalis n. var.

**Arion?* *andersoni* n. sp.

**Ariolimax californicus* n. sp.

**Lysinoe diabloensis* n. sp.

**Ariolimax niger* n. sp.

29. On the Law of Variation in the Banded California Land Shells. Pr. C. A. S., V., 121-5, Pl. VII, VIII. 1873.

30. Note on *Alexia setifer* and its Allies. Pr. C. A. S., V., 172. 1873.

31. California During the Pliocene Epoch; in the Miocene Epoch; The Eocene Epoch in California; Note on Tertiary Formation of California. Pr. C. A. S., V, 389-392, 401-404, 419-421, 422. 1874.

32. The Origin of California Land Shells. Pr. C. A. S., VI, 12-14. 1875.

33. On Shells of the West Slope of North America. No. III. Pr. C. A. S., VI, 14-27. 1875. Notes on about 75 species. See No. 27.

34. The Age of the Tejon Group, California. Am. Jour. Sci., 3d ser., vol. 14, 321-2. 1877. From Pr. C. A. S., Nov., 1874.

35. Notes on Some Land Shells of the Pacific Slope. Proc. Am. Phil. Soc., XVIII, 282-288. 1879. Notes on about 30 species.

36. On Fossil and Sub-Fossil Land Shells of the United States, with Notes on Living Species. Bull. C. A. S., I, No. 4, 235-255. 1885.

37. West Coast Pulmonata; Fossil and Living. Bull. C. A. S., II, No. 7, 355-376 and map; Bull. C. A. S., II, No. 8, 497-514; Pr. C. A. S. (2), I, 11-24. 1887.

38. Catalogue of Californian Fossils. Cal. State Mining Bureau, 7th Ann. Rep. State Mineralogist, 221-308. 879 species of Mollusca, with geographical range of those in the list now living. 1888.

39. Fresh-Water Mollusca of San Francisco County. Zoe, I, 196-7. 1890.

40. The Value of Fossils as Indications of Important Mineral Products. 9th Ann. Rep. State Mineralogist, 284-6. 1890.

41. Notes on the Subalpine Mollusca of the Sierra Nevada, near lat. 38° (with Plate I), by W. J. Raymond. Additional Notes and Descriptions of New Species by J. G. Cooper, M. D. Pr. C. A. S. (2), III, 61-69 and 70-91. 1890.

Primella n. subgen. (of *Sphærium*).

Sphærium raymondi n. sp.

Ancylus caurinus W. Cp., var. *subalpinus* n. var.

Planorbis subcrenatus Cpr., var. *disjectus* n. var.

42. On Land and Fresh-Water Shells of Lower California. No. 1. Pr. C. A. S. (2), III; 99-103. 1891.

Bulimulus inscendens W. G. B., subsp. *bryanti* n. subsp.

Rhodea californica Pf., subsp.? *ramentosa* n. subsp.

43. The same, No. 2. Pr. C. A. S. (2), III, 207-217. 1892.

Bulimulus inscendens W. G. B., var. *beldingi* n. var.

Bulimulus sufflatus Gld., var. *insularis* n. var.

Columna ramentosa J. G. C. replaces *Rhodea* subsp. *ramentosa*.

Columna ramentosa J. G. C., var. *abbreviata* n. var.

Helix areolata Pf., var. *exanimata* n. var.

44. The same, No. 3. Pr. C. A. S. (2), III, 338-344, Pl. XIII, XIV. 1893. Fuller descriptions and figures of species named in 1 and 2.

Melaniella? *eiseniana* n. sp.

Planorbis anitensis n. sp.

Planorbis peninsularis n. sp.

Helicodiscus lineatus Say, *sonorensis* n. subsp.

45. The same, No. 4. Pr. C. A. S. (2), IV, 130-143, Pl. V, VI. 1894.

Bulinulus (pallidior?) vegetus Gld., var. *vegerspiza* n. var.

Melaniella tastensis n. sp.

46. The same, No. 5. Pr. C. A. S. (2), V, 163-5. 1895.

Bulinulus decipiens n. sp.

Pliocolumna n. gen.

47. Catalogue of the Land and Fresh-Water Mollusca of Lower California. Zoe, III, 12-25. 1892.

48. Catalogue of Californian Fossils. Bull. No. 4, Cal. State Mining Bureau, 65 pages and Pl. I-VI. 1894. See No. 38.

Part II. Bibliography and References. Includes many titles of papers on Recent Shells. Part III. Additions to the Catalogue of Californian Fossils Obtained since 1888. Part IV. Remarks on Fossils Collected by Dr. S. Bowers. Part V. Descriptions and Figures of New Species. Thirty-seven new species Cretaceous and Cretaceous B (or Eocene). See p. 7.

49. Catalogue of West North American and Many Foreign Shells. Printed for the State Mining Bureau. Also a complete list of Mollusca known to inhabit the West Coast of North America, from Sitka, Alaska, to Cape St. Lucas, and inland to the Rocky Mountains, north of Mexico. 1894.

50. On Some Pliocene Fresh-Water Fossils of California. Pr. C. A. S. (2), IV, 166-172, Pl. XIV. 1894.

Margaritana subangulata n. sp.

51. Catalogue of Marine Shells, collected chiefly on the eastern shore of Lower California. Pr. C. A. S. (2), V, 34-48. 1895. List of 191 species.

52. On West Mexican Land and Fresh-Water Mollusca. Pr. C. A. S. (2), V, 166-9. 1895. Seventeen species and varieties.

53. On Some New Cretaceous (and Eocene?) Mollusca of California. Pr. C. A. S. (2), VI, 330-337, Pl. XLVII, XLVIII. 1896.

Sistrum cretaceum n. sp.

Triplicosta n. subgen.

Littorina subobesa n. sp.

Pholadomya (Triplicosta) pro-

Calliostoma lignitica n. sp.

gressiva n. sp.

Sigaretus costotus n. sp.

No. 48. Bull. 4, Cal. State Mining Bureau. Cretaceous and Eocene species :

<i>Terebra wattsi</i> n. sp.	<i>Fusus supraplanus</i> n. sp.
<i>Surcula crenatospira</i> n. sp.	<i>Mitra simplicissima</i> n. sp.
<i>Surcula monilifera</i> n. sp.	<i>Stomatia intermedia</i> n. sp.
<i>Surcula inconstans</i> n. sp.	<i>Calliostoma kempiana</i> n. sp.
<i>Pleurotoma perkinsiana</i> n. sp.	<i>Tornatella normalis</i> n. sp.
<i>Pleurotoma decipiens</i> n. sp.	<i>Bulla assimilata</i> n. sp.
<i>Drillia ullreyana</i> n. sp.	<i>Tornatina erratica</i> n. sp.
<i>Mangilia suturalis</i> n. sp.	<i>Siphonaria capuloides</i> n. sp.
<i>Cordiaera gracillima</i> n. sp.	<i>Astarte semidentata</i> n. sp.
<i>Cancellaria irelaniana</i> n. sp.	<i>Crassatella lomana</i> n. sp.
<i>Ancilla (Oliverato) californica</i>	<i>Cucullæa bowersiana</i> n. sp.
n. subgen., n. sp.	<i>Corbula triangulata</i> n. sp.
<i>Bittium longissimum</i> n. sp.	<i>Mytilus dichotomus</i> n. sp.
<i>Cerithium fairbanksi</i> n. sp.	<i>Crenella santana</i> n. sp.
<i>Potamides carbonicola</i> n. sp.	<i>Megerlia dubitanda</i> n. sp.
<i>Potamides davisiana</i> n. sp.	<i>Waldheimia imbricata</i> n. sp.

Miocene and Pliocene species :

<i>Agasoma barkerianum</i> n. sp.	<i>Anodonta (nuttalliana) lignitica</i>
<i>Trophosyon kernianum</i> n. sp.	n. var.
<i>Limnæa contracosta</i> n. sp.	<i>Amnicola yatesiana</i> n. sp.
<i>Planorbis pabloanus</i> n. sp.	

GENERAL NOTES.

A NEW BRITISH VITREA.—In the last (April) number of the *Journal of Conchology*, Mr. B. B. Woodward describes a new *Vitrea* from Cheshire, *v. rogersi*. It stands near *v. alliaria* and *v. helvetica*, and has been identified also as *v. glabra*. It is named for the late Mr. T. Rogers of Manchester, who first (1870) found British specimens.

ERRATA.—Owing to the absence of both editors from Philadelphia during the printing of the April number, some typographical errors escaped correction on the proofs. On p. 136, 4th line, the first word should be Hiezian. In the second paragraph on p. 137, the second word should be *largillierti*, and the 16th line from bottom of same page should begin with a capital M. On p. 139 the term Pelecypods is misspelled. There are also some other like errors.